

Operating instructions for rescue equipment

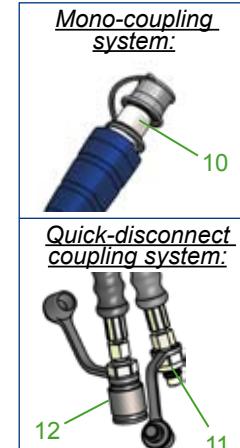
➤ Electrically insulated Cutters and Combi Tools



STREAMLINE TECHNOLOGY



1	Star grip	8	Pressure hose line
2	Tool body	9	Return hose line
3	Handle	10	Mono-coupling nipple
4	Protection hose	11	Plug coupling nipple
5	Blade arm	12	Plug coupling sleeve
6	Combi blade arm	13	Protection box for plug coupling
7	Handhold	14	Protection box for mono-coupling



172075085 GB
Edition 10.2010

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1. Hazard classes

We distinguish between various categories of safety notes. The table below gives you an overview of the assignment of symbols (pictograms) and key words to the specific hazard and possible consequences.

Pictogram	Damage / injury to	Key word	Definition	Consequences
	human	DANGER!	Immediate danger	Death or major injury
		WARNING!	Potentially dangerous situation	Potential death or major injury
		CAUTION!	Less dangerous situation	Minor or slight injury
	device	CAUTION!	Danger of damage to device / environment	Damage to the equipment, damage to the environment, damage to surrounding materials
	-	REMARK	Advice for application and other important / useful information and advice	No injury / damage to persons / environment / equipment



Wear helmet with face protection



Wear safety gloves



Wear safety shoes



Proper recycling



Observe principles of environmental protection



Read and observe operating instructions

2. Product safety

LUKAS products are developed and manufactured in order to guarantee the best performance and quality when used properly.

Operator safety is the most important aspect of the product design. Moreover, the operating instructions are intended to help the safe use of LUKAS products.

The generally applicable, legal and other binding regulations pertaining to the prevention of accidents and protection of the environment apply and are to be implemented in addition to the operating instructions.

The equipment may only be operated by persons with appropriate training in the safety aspects of such equipment – otherwise, there is a danger of injury occurring.

We would like to point out to all users that they should read carefully the operating instructions and the instructions contained therein before they use the equipment, and that they should carefully follow such.

We further recommend that a qualified trainer train you in the use of the product.



WARNING / CAUTION!

The operating instructions for the hoses, the accessories and the connected hydraulic equipment must also be observed!

Even if you have already received instructions on how to use the equipment, you should still read the following safety notes through again.



WARNING / CAUTION!

Ensure that the accessories and connected equipment used are suitable for the max. operating pressure!

	Please ensure that no body parts or clothing get stuck between the visibly moving parts (e.g. blade arms).	It is prohibited to work under load if this load is lifted exclusively by hydraulic equipment. If this work is absolutely imperative, additional mechanical supports must be used.	
	Wear protective clothing, safety helmet with visor, protective gloves	Inspect the equipment before and after use for visible defects or damage	
	The responsible department is to be informed immediately of any changes (including to the operating behaviour)! If necessary, the equipment is to be deactivated immediately and secured!	Inspect all cables, hoses and screwed connections for leaks and externally visible damage! If necessary, repair immediately! Squirting hydraulic fluid can result in injuries and fires.	

 	<p>In the event of malfunctions, immediately deactivate the equipment and secure it. The malfunction is to be repaired immediately.</p>	<p>Do not carry out any changes (additions or conversions) to the equipment without obtaining the prior approval of LUKAS.</p>	
 	<p>Observe all safety and danger notes on the equipment and in the operating instructions.</p>	<p>All safety and danger notes on the equipment are to be kept complete in a legible condition.</p>	 
 	<p>Any mode of operation which impairs safety and/or stability of the equipment is forbidden!</p>	<p>Comply with all specified dates or dates specified in the operating instructions pertaining to regular controls / inspections on the equipment.</p>	
 	<p>Safety devices may never be deactivated!</p>	<p>The maximum permitted operating pressure noted on the equipment must not be exceeded.</p>	 
	<p>Before the equipment is switched on/started up, and during its operation, it must be ensured that nobody is endangered by the operation of the equipment.</p>	<p>Only original LUKAS accessories and spare parts may be used for repairs.</p>	
		<p>Please ensure that, when working with this equipment or during transportation of such, you don't get stuck in the looped hoses and trip.</p>	 
	<p>Only touch any broken-off parts or the cut-off parts wearing protective gloves, since the torn / cut edges can be very sharp.</p>	<p>Please note that, when cutting or spreading, tearing or breaking can cause falling material, or sudden removal of such can cause it to suddenly catapult off: necessary precautions need to be taken.</p>	
	<p>The equipment is filled with a hydraulic fluid. These hydraulic fluids can be dangerous to health if swallowed or their vapours inhaled. Direct contact with the skin is to be avoided for the same reason. Please also note that hydraulic liquids can also have a negative effect on biological systems.</p>	<p>When working with or storing the equipment, ensure that the function and the safety of the equipment are not impaired by the effects of stark external temperatures or that the equipment is damaged in any way. Please note that the equipment can also heat up over a long period of use.</p>	

	Ensure adequate lighting when you are working.	Before transporting the equipment, always ensure that the accessories are positioned such that they cannot cause an accident.	
	Always keep these operating instructions within reach where the equipment is used.	Ensure the proper disposal of all removed parts, left-over oil and hydraulic fluid as well as packaging materials!	

The generally applicable, legal and other binding national and international regulations pertaining to the prevention of accidents and protection of the environment apply and are to be implemented in addition to the operating instructions.

WARNING / CAUTION!

The equipment is to be used exclusively for the purpose stated in the operating instructions (see chapter "Proper Use"). Any other or further use is not considered proper use. The manufacturer / supplier is not liable for any damages resulting from improper use. The user bears sole responsibility for such.

Observance of the operating instructions and compliance with the inspection and maintenance conditions are part of the proper use.



Never work when you are overtired or intoxicated!



3. Proper use

The electrically insulated LUKAS "LKS" combi tools and electrically insulated LUKAS "LS" cutters are designed specifically for rescuing victims of traffic, rail or air accidents and for making rescues from buildings. They serve the purpose of freeing injured people in accidents e. g. by cutting doors, roof bars and hinges. By using the LUKAS combi tools, trapped persons can also be freed e. g. by spreading doors and / or by removing obstacles with the aid of a chainset. Basically, the combi tools can be used to cut, pull, spread, squeeze and lift. Basically, LUKAS cutters can only be used to cut objects.

All objects which are to be worked on are to be secured using stable supports or substructures.

The electrically insulated LUKAS tools are protected against power arcing (between the object being worked on and the operator) of up to 1,000 V (AC) or 1,500 V (DC). This means that objects under live voltage can be cut, squashed or spread providing this maximum electrical voltage is not exceeded.

When working on such objects you must ensure that you do not come directly into contact with metallic components of the rescue tool (e.g. the cutter) as these may be live.

A protection box is provided specially for the couplings of the electrically insulated tools to protect the operator from power surges at these points.

LUKAS cutting and combi tools can, in principle, be used underwater at depths of up to 40m (131 ft), but live parts must **not** be cut or crushed underwater.



CAUTION!

When working underwater you must however be extremely careful not to cause leaks as this can damage the environment.



WARNING / CAUTION!

All objects which are to be worked on are to be secured using stable supports or substructures.



WARNING / CAUTION!

The following may not be cut / squeezed:

- **current carrying** cables whose electrical voltage is higher than the dielectrical strength of the electrically insulated tools.
- **pretensioned and hardened** parts such as springs, spring steels, steering columns and rollers
- tubes / hoses under gas or liquid pressure,
- compound materials (steel/concrete)
- explosive bodies such as airbag cartouches

NEVER operate the rescue equipment at a higher operating pressure than that stated in the chapter "Technical data". A higher setting can result in material damage and/or injuries.

You can obtain accessories for the rescue tools from your authorised LUKAS dealer!

4. Description of the functions

4.1 Description

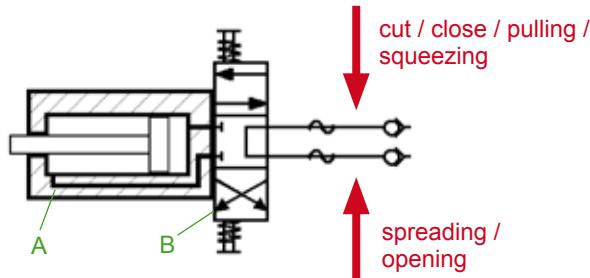
The equipment is designed such that, via a hydraulically activated piston, two equal, opposite blade arms are symmetrically opened / closed by mechanical joints, thereby spreading, squeezing, pulling or cutting objects.

All cutters and combi tools ensure full load-holding function when disconnected from the hydraulic supply (e. g. when being unintentional decoupled; defective hose, and so on).

The tools are protected by special handles, the special protection hose and protection box for the couplings that protect the operator from power arcing.

4.2 Circuit diagram

To enable comprehension of the function, a simplified hydraulic cylinder of the rescue equipment (A) + hand valve (B) are depicted here.



4.3 Control of working movements

The movement of the piston is controlled via the star grip for the fitted valve (see cover sheet Item 1 and Figure 3 below).



Fig. 3

4.4 Hydraulic supply

A LUKAS motor pump or hand pump only may be used to drive the equipment. If the pump unit is a different make, you must make sure that it complies with LUKAS specifications, otherwise potential dangers may occur which are not the responsibility of LUKAS. Ensure in particular that the authorised operating pressure for LUKAS equipment is not exceeded.



REMARK:

Before you use pumps from a different manufacturer, you must contact LUKAS or an authorised dealer.

4.5 Hose lines

The pump unit and rescue tool are connected via special hose lines that also prevent power arcing.

5. Connecting the equipment

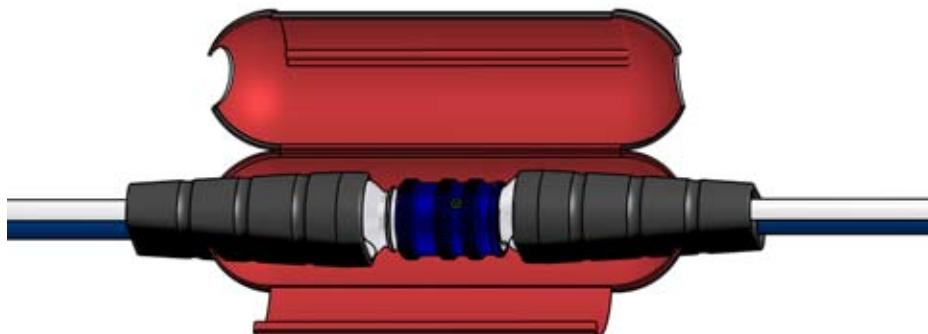
5.1 General points

The tool is equipped with two hose lines; they are connected to the pump unit via two hoses. All hose assemblies are marked with a colour and have couplings to enable unmistakable connection.



WARNING / CAUTION!

To protect from electrical power arcing, the coupling parts must be always be enclosed inside an appropriate LUKAS protection box before starting the rescue work!!



REMARK:

The devices can be equipped with different coupling systems. They differ only by the article number and not by the designation. Of course the coupling systems can also be reequipped at a later time.



WARNING / CAUTION!

Before connecting the equipment you have to pay attention that **all used components** are suitable to the **max operation pressure of the pump unit!** In the case of doubt you **have to inquire LUKAS** directly!

5.2 Coupling the mono-couplings

The equipment is connected to the hydraulic pump via mono-coupling halves (male and female).



Before coupling, remove dust protection caps, then connect male and female, and turn the locking sleeve of the female to direction „1“ until the locking sleeve locks into place. The connection has now been established and secured. Decoupling is by turning the locking sleeve to direction „0“.

The equipment can also be coupled under pressure provided the connected equipment is not activated.



REMARK:

We **recommend** coupling the coupling halves in a **pressureless** state, when working in areas with low ambient temperature and the usage of extension hose assemblies / hose reels, otherwise coupling could need very high expenditure of force.

To protect them from dust, the accompanying dust protection caps must be put back on.

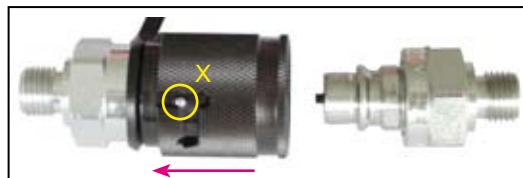


WARNING / CAUTION!

The mono-couplings **may not be screwed off** the hose assemblies and / or the hose assemblies be **confused!**

5.3 Coupling the plug couplings

The equipment is connected to the hydraulic pump via quick-disconnect-coupling halves (male and female).



Before coupling unlock the connect socket by turning the sleeve into position X. Retract sleeve and connect plug and socket. Release sleeve and turn it into position Y. The connection has now been established and secured. Uncoupling is done in the reverse order.



CAUTION!

Always connect the return line first and afterwards the supply line!



REMARK:

Coupling of the devices is only possible, when the hoses are **depressurized**.

To protect them from dust, the accompanying dust protection caps must be put back on.



WARNING / CAUTION!

Some of the plug couplings have special functions and must therefore **not** be **unscrewed** from the hose lines and/or **swapped round**!

6. Operation

6.1 Preparatory actions

6.1.1 Initial commissioning

Before commissioning and following repairs, the equipment must be deaerated.

- Connect the equipment to the hydraulic pump (see chapter "Connecting the equipment").
- Open / close the blade arms of the equipment without any load at least twice (see chapter "Operation of the star grip").



REMARK:

We recommend that during the deaeration, the attached aggregate for the hydraulic supply should stand on a higher level than the body of the rescue tool.

Recommended procedure for the deaeration of the rescue tool:

- 1.) Fully open and close the tool once with the blade arms pointing upwards.
- 2.) Fully open and close the tool once with the blade arms facing downwards.
- 3.) Fully open and close the tool once with the blade arms pointing upwards.
- 4.) Fully open and close the tool once with the blade arms facing downwards.

6.1.2 Checking the pump unit



See separate operating instructions for the relevant unit (or the hand pump).



REMARK:

Before each start-up of the hydraulic unit you have to make sure that the actuating valves are set to depressurized circulation.



REMARK:

Before coupling the quick-disconnect couplings, the actuating valves of the hydraulic unit are set to depressurized circulation.

If you use mono-couplings, you can also couple when the hoses are pressurized!

6.2 Operating the star grip (Item 1 on cover sheet)



Opening the tool ( **):**

Turn the star grip in a clockwise direction (in the direction of the relevant symbol) and keep in this position.



Closing the tool ( **):**

Turn the star grip in an counterclockwise direction (in the direction of the relevant symbol) and keep in this position.



“Dead-man’s” function:

Following release, the star grip automatically returns to the central position, guaranteeing the full load-holding.

7. Cutting, spreading, pulling and squeezing

7.1 Safety instructions

Before rescue works can commence, the position of the obstacle must be stabilised.

You must ensure an adequate substructure and / or adequate support of the object.

World-wide, safety guidelines pertaining to the specific country are to be observed and complied with. In the Federal Republic of Germany, regular safety inspections according to the GUV legal accident insurance regulations (Gesetzlichen Unfallversicherung) are mandatory.

In the event of a potentially explosive situation, it is not permitted to use motor pumps (danger of the formation of sparks). In such cases, hand pumps are to be used.

The following are to be worn when working with the rescue equipment:

- protective clothing,
- safety helmet with visor or protective goggles,
- protective gloves
- and, if necessary, ear protection

Before activating the rescue equipment, always ensure that there is no danger to persons either involved / uninvolved in the action by the movement of the rescue equipment or by flying fragments. Further avoid unnecessary damage to property belonging to others, objects not involved by the rescue equipment / flying fragments.



Reaching between the blade arms is strictly forbidden!

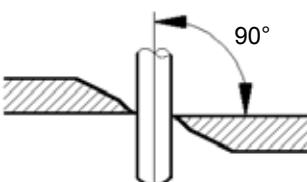


WARNING / CAUTION!

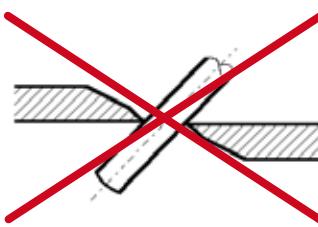
The particular effect of the force of the rescue equipment during operation could cause pieces of the vehicle to break off or fly off, posing a danger to persons. Those not involved in the rescue operation should therefore **keep at a distance appropriate to the situation**.

7.2 Cutting

The blades must be positioned at a 90° angle to the object to be cut.

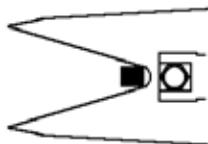


RIGHT

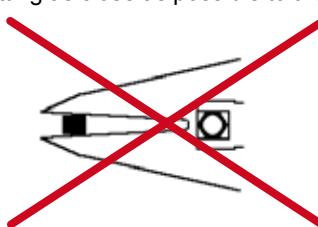


FALSE

Higher cutting capacities can be achieved by cutting as close as possible to the blade's pivot point.



RIGHT



FALSE

During cutting, the gap between the blade tips (in the crosswise direction) may not be exceeded, otherwise the blade is in danger of breaking:

Cutter / combi tool	max. gap on the blade tips [mm] / [in.]
LS 311 FI STREAM	3 / 0.12
LS 330 FI STREAM	3 / 0.12
LKS 35 FI STREAM	3 / 0.12

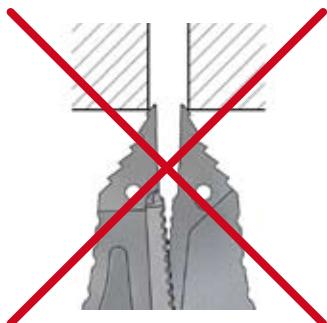


CAUTION!

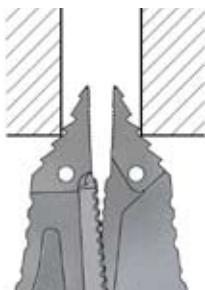
Avoid cutting particularly high-strength parts of the vehicle's bodywork (e.g. side-impact protection): this almost always causes damage to the cutter / combi tool!

7.3 Spreading (combi tools only)

Use the front area of the tips for increasing the gap only. Full spreading capacity can be achieved when approximately half of the grooved area of the tips is used. The greatest force is created in the rear area of the spreading range of the combi blade.



Working surface is too small, tips slip off.
Only for increasing the size of a gap (not suitable for spreading).



Tips get a safe grip.



Work with the tips only.
Do not damage the arms.

7.4 Pulling (combi tools only)

You may only use LUKAS chain sets for pulling purposes.

Before the pulling process can be performed, ensure that the bolt and hook fit correctly to prevent the chain from slipping.

Only chain sets in perfect condition may be used!

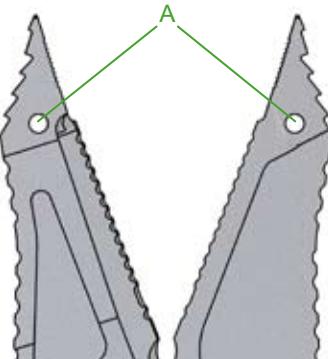
The pull chains are to be inspected at least once per year by an expert!

See separate operating instructions for the relevant LUKAS chain set in order to correctly attach, affix and use the chain sets.

The connection pieces of the LUKAS chain sets are affixed to the boreholes A on the blades using load bolts (see figure, right).

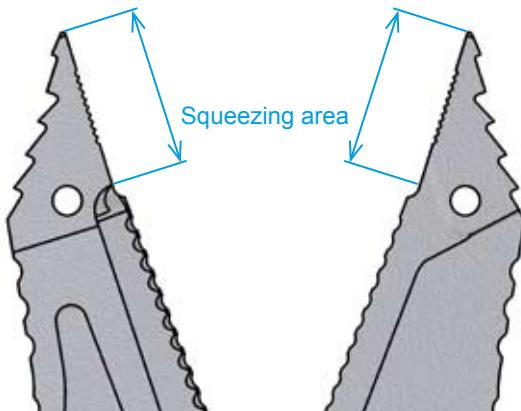
Chain sets:

for LKS 35 Fl: KSV 8



7.5 Squeezing (combi tools only)

Basically, squeezing can only be carried out in the area of the tips (see figure below).



8. Dismantling the equipment / deactivation following operation

8.1 Cutting or combi tool

Once work has been completed, the blade arms are to be closed so that there is a tip distance of just a few mm. This relieves the hydraulic and mechanical strain on the equipment.



REMARK:

Never store the cutter / combi tool with fully closed blade arms! The complete closure of the blade arms can cause hydraulic and mechanical stress to build up again.

Free the rescue equipment of any stubborn dirt which may have become attached during use.

If the equipment is to be stored for a longer period of time, the exterior is to be cleaned completely and the mechanically mobile parts are to be lubricated.

Avoid storing the rescue equipment in a damp environment.

See also the chapter "Safety regulations for hoses".

8.2 Hydraulic unit

Upon completion of work, the unit must be deactivated.

8.3 Hose lines

First of all, decouple the pressure hose then the return hose as described in chapter "Connecting the equipment".

Ensure that you put the dust protection caps back on to the couplings.

9. Maintenance and service

The equipment are subject to very high mechanical stresses. A visual inspection is to be carried out after every use: however, at least one visual inspection is to be carried out every six months. These inspections enable the early detection of wear and tear, which means that punctual replacement of this wearing parts prevents breakages from occurring. Also regularly check the torque of the pivot bolt. (Torque M_A see "Technical Data").

Every three years also a crack test of the blades are essential. Therefore a special crack testing kit is available.

Every three years or if there is any doubt regarding the safety or reliability of the equipment, a function test must also be performed. (Please also observe the relevant valid national and international regulations pertaining to service intervals of rescue equipment). In the Federal Republic of Germany, regular safety inspections according to the GUV legal accident insurance regulations (Gesetzlichen Unfallversicherung) are mandatory.



CAUTION!

Clean off any dirt before controlling the equipment!



WARNING / CAUTION!

In order to carry out maintenance and repair works, tools appropriate for the job and personal protecting equipment are essential.

9.1 Cutting / combi tool, complete

Inspections to be carried out:

Visual inspection

Cutter / combi tool

- Opening width of the blade arms on the tips (see chapter "Technical data"),
- General tightness (leaks),
- Operability of the star grip,
- Existence and stability of handle,
- Labels completely existent and legibly,
- Covers in perfect condition,
- Torque control of the pivot bolt (torque M_A see "Technical data"),
- Couplings must be easy to couple,
- Dust protection caps must be available.

Blade arms

- Blade arms free of tears and without any chipped spots or deformations on the cutting surfaces,
- Cutting surfaces go on top of each other without making contact,
- Bolts and retaining rings of the blade arms must be present and in correct working order,
- Grooving of the tips must be clean and squared, and not have any tears (applies to combi tools).

Hoses (see also "Safety regulations for hydraulic hoses")

- Visual control for visible damage,
- Control for leaks.

Function test

- Opening and closing function flawlessly upon activation of the star grip,
- no suspicious noises,
- no further movement of the blade arms upon interruption of the valve activation during the process ("dead-man's" function).

9.2 Safety guards

- Control of the protective equipment on / around the rescue equipment, especially the hand guard of the moveable parts (they must be free of tears!).
- If there is any doubt concerning the power arcing resistance, or in the event of damage to the protection hose, an additional insulation test is required. This test must be carried out taking all applicable laws, standards and regulations into consideration.



WARNING / CAUTION!

Insulation tests must be carried out using appropriate measuring equipment and in compliance with the applicable laws, standards and regulations, or must be carried out by LUKAS directly.

10. Repairs

10.1 General points

Servicing may only be carried out by the manufacturer or personnel trained by the manufacturer and by authorised LUKAS dealers.

Only LUKAS spare parts may be used to replace all components (see spare parts list) since special tools, assembly advice, safety aspects, inspections might have to be complied with (see also chapter "Maintenance and Service").

During assembly, ensure the complete cleanliness of all components, since dirt can damage the rescue equipment!

WARNING / CAUTION!



Protective clothes must be worn when repairs are being carried out, since parts of the units can also be pressurised in an idle state.

REMARK:



Please always return the guarantee registration card to LUKAS Hydraulik GmbH. Only then are you entitled to the extended guarantee.

REMARK:



Before you use couplings from a different company, you must contact LUKAS or an authorised dealer.

REMARK when using the quick-disconnect-coupling system:



*Overpressure protection of the rescue equipment
(model with yellow coupling nipple on the return hose)*

If the equipment's short hoses are not connected to a unit, temperature increases can inadvertently cause pressure to build up in the equipment. Hence, the return hose of the equipment is equipped with a safety coupling (quick-disconnect coupling male, yellow). Unwanted overpressure (approx. 1.5 Mpa) is automatically released via this nipple: hydraulic fluid leaks.

Should an hydraulic fluid leak on the coupling male be more frequent, please contact your dealer or LUKAS itself.

If couplings from a different company are used which do not have this function, the overpressure protection can react in the valve of the rescue equipment. Hydraulic fluid leaks in the area of the star grip. Following the reduction in pressure, the valve is once again tight.

Should the valve leak permanently, please immediately contact your dealer or LUKAS itself.

CAUTION!



Because LUKAS rescue equipments are appropriate for highest achievements, only components may be exchanged, which are specified in the spare parts list of the appropriate equipment.

Further components of the equipment may only be exchanged, when:

- you have participated on an appropriate LUKAS service training.
- you have the express permission of LUKAS customer service (after inquiry, assessment prior to granting of permission. All cases must be assessed individually!)

10.2 Preventative service

10.2.1 Note concerning care

The exterior of the equipment is to be cleaned from time to time in order to protect it from external corrosion. Oil is to be applied to the metallic surfaces.

10.2.2 Functional and loading test

If there is any doubt regarding the safety or reliability of the equipment, a function and load test must also be performed.

LUKAS offers appropriate test equipment to this end.

10.2.3 Replacing the hydraulic fluid

- The hydraulic fluid must be changed after the equipment has been used approx. 200 times / after three years at the latest.
- It must always be changed when the hydraulic fluid for the accompanying pump (motor/ hand pump) is changed. This ensures that the fresh fluid is not contaminated by used fluid in the rescue tool.

Procedure:

1. Close blade arms (until the tips are almost touching).
2. Change the hydraulic fluid of the pump. Please observe the separate operating instructions for the pump being used!
3. Screw off the return hose on the pump:
 - **if the hose is connected to the pump directly:**
completely unscrew the connection nut of the connection piece of the blue return hose.
 - **if the hose is connected to the pump via a mono-coupling:**
remove the cover from the mono-coupling (male).
completely unscrew the connection nut of the blue returnhose on the mono-coupling (male).
 - **if the hose is connected to the pump using a plug coupling:**
completely release the union nut of the hose line from the plug coupling nipple of the blue return line.
4. Put the return hose into a separate collecting basin for the hydraulic fluid still in the equipment.
5. Slowly open the tool (the pump must be working during this time). The old hydraulic fluid from the ring space side runs via the return hose into the separate collecting basin, and is to be disposed of in the same manner as the old hydraulic fluid of the pump.
6. Switch the pump off (motor pump) / no longer activate it (e.g. hand pump).
7. Reconnect the return hose to the pump:
 - **if the hose is connected directly to the pump:**
screw the connection nut of the connection piece of the blue return hose
(Please observe the necessary torque of $M_A = 40 \text{ Nm!}$)
 - **if the hose is connected to the pump via a mono-coupling:**
screw the connection nut of the blue return hose
(Please observe the necessary torque of $M_A = 40 \text{ Nm!}$)
Pull back the cover on the couplings as far as the limit stop.
 - **if the hose is connected to the pump using a plug coupling:**
Screw the union nut of the hose line back onto the plug coupling nipple of the blue return line.
(Please observe the necessary torque of $M_A = 35 \text{ Nm!}$)
8. Deaerate the rescue tool as described in the chapter "Preparatory measures".

10.3 Repairs

Since repairs to the electrically insulated rescue tools must always be concluded by testing and confirmation of the minimum electrical arcing resistance, repairs may only be carried out by authorised specialised dealers or by LUKAS directly.

11. Troubleshooting

Trouble	Control	Cause	Solution
Blade arms move slowly or jerkily when activated	Are the hoses connected properly? Does the pump unit work?	Air in the hydraulic system	Deaerate pump system
Device doesn't perform at its given power	Check the hydraulic fluid level in the supplying pump	Insufficient hydraulic fluid in the pump	Top up hydraulic fluid, deaerate
Following release, the star grip doesn't return to the central position	Cover damaged or star grip hard to move?	Damage to the torsion spring for reset Soiled valve or star grip Defective valve Other mechanical damage (e. g. star grip)	Repair by an authorised dealer, by personnel specially trained by LUKAS, or by LUKAS itself
<u>with mono-coupling-system:</u> Hoses cannot be coupled		Pressure too high (e.g. caused by too-high ambient temperature) Coupling defective	Set hydraulic pump to pressureless circulation Coupling needs to be replaced immediately
<u>with mono-coupling-system:</u> It is frequently not possible to couple hose assemblies	Control the degree of viscosity and application temperature of the used hydraulic fluid	Hydraulic fluid not adapted to the application situation Coupling defective	Hydraulic fluid must be replaced (see chapter "Recommended Hydraulic fluids") Coupling needs to be replaced immediately
<u>with quick-disconnect-coupling-system:</u> Hoses cannot be coupled	Is the pump working?	Pressurized Coupling defective	Relieve pump Coupling needs to be replaced immediately
Hydraulic fluid leak on the hoses or the fixing-ins	Are the hoses defective?	Leak, possible damage	Replace hoses

Trouble	Control	Cause	Solution
Damages on the surface of the hydraulic hoses		Mechanical damages or contact with aggressive agents	Replace hoses
Hydraulic fluid leaks on the piston rod		Defective rod seal Damage to the piston	Repair by an authorised dealer, by personnel specially trained by LUKAS, or by LUKAS itself
Leak on the handhold	Increase load? (combi tool when spreading)	Load increase (e.g. something has fallen onto the part to be lifted, thereby suddenly increasing the load)	Secure the loads and move them by using other tools Move the load somewhere else, where the moving load is lighter Use supporting equipment to move the load.
	Does the pressure set on the pump comply with the maximum permissible pressure on the rescue equipment?	Pressure release in the Rescue tool.	Following the reduction in pressure, no further leak is present. Should, however, there be a further leak on the handhold, immediately deactivate the rescue equipment, and contact an authorised dealer or LUKAS itself.
	Hoses in handhold loose?	Hoses in handhold not tightened	Tighten hoses.
	Check the connections of the mono-coupling (female)	Supply and return connection of the mono-coupling (female) inverted	Reconnect the hoses of the mono-coupling (female) in the right way
<u><i>Especially by usage of quick-disconnect-couplings:</i></u> Leak on the handhold	Is the return hose connected correctly?	Return hose is not coupled correctly or not connected.	Re-connect the return hose and secure it.

Trouble	Control	Cause	Solution
<i><u>Especially by usage of mono-couplings:</u></i> Leak on the handhold	check the connections of the hoses	hose connection to the couplings interchanged	reconnect the hoses to the coupling in the right way
		Returnline disabled	disconnect the returnline from the coupling, clean it and reconnect it.
<i><u>with mono-coupling-system:</u></i> Leak in the couplings	Is the coupling damaged?	coupling damaged	Coupling must be replaced immediately
<i><u>with quick-disconnect-coupling-system:</u></i> Leak in the couplings	Is the coupling damaged? Is the leak only on the coupling male (in uncoupled status)?	coupling damaged Safety valve reacted	Coupling must be replaced immediately After pressure release there is no more leakage.

If it isn't possible to rectify the malfunctions, inform an authorised LUKAS dealer or the LUKAS customer service department immediately!

The address for the LUKAS customer service department is:

LUKAS Hydraulik GmbH

Weinstraße 39, D-91058 Erlangen
Postfach 2560, D-91013 Erlangen

Tel.: (+49) 09131 / 698 - 348
Fax.: (+49) 09131 / 698 - 353

12. Technical Data

Since all values are subject to tolerances, minor differences may occur between the data on your equipment and the data in the following schedules!

12.1 Cutting tools

type	LS 330 FI STREAM	LS 330 FI STREAM
ref.no.	112070000	172070000
dimensions l x w x h (w/o connection hoses)	[mm] [in.]	733 x 210 x 195 28.85 x 8.27 x 7.68
max. cutting opening	[mm] [in.]	228 8.98
max. cutting force (rear end of the cutting surface)	[kN] [lbf.]	616 138,489
weight incl. hydraulic fluid	[kg] [lbs.]	17,7 39.0
max. operating pressure	[Mpa] * [psi.]	70 10,153
min. needed volume of hydraulic fluid	[l] ** [gal.-US]	0,098 0.026
coupling system	quick-disconnect-coupling	mono-coupling

* 1 MPa = 10 bar

** Required volume of hydraulic fluid in the hydraulic power pack for operating the tool (differential volume piston/rod side)

type		LS 311 FI STREAM	LS 311 FI STREAM
ref.no.		112075000	172075000
dimensions l x w x h (w/o connection hoses)	[mm] <i>[in.]</i>	697 x 210 x 195 <i>27.44 x 8.27 x 7.68</i>	
max. cutting opening	[mm] <i>[in.]</i>	150 <i>5.91</i>	
max. cutting force (rear end of the cutting surface)	[kN] <i>[lbf.]</i>	642 <i>144,335</i>	
weight incl. hydraulic fluid	[kg] <i>[lbs.]</i>	16,9 <i>37.26</i>	
max. operating pressure	[Mpa] * <i>[psi.]</i>	70 <i>10,153</i>	
min. needed volume of hydraulic fluid	[l] ** <i>[gal.-US]</i>	0,098 <i>0.026</i>	
coupling system	quick-disconnect-coupling	mono-coupling	

* 1 MPa = 10 bar

** Required volume of hydraulic fluid in the hydraulic power pack for operating the tool (differential volume piston/rod side)

12.2 Combi tools

type		LKS 35 FI	LKS 35 FI
ref.no.		113070000	173070000
dimensions l x w x h (w/o connection hoses)	[mm] [in.]	762 x 210 x 195 30.00 x 8.27 x 7.68	
max. cutting opening	[mm] [in.]	265 10.43	
max. cutting force (rear end of the cutting surface)	[kN] [lbf.]	418 93,975	
max. spreading distance (on the blade tips)	[mm] [in.]	360 14.17	
max. spreading force (25mm from the tips)	[kN] [lbf.]	49,5 11,129	
weight incl. hydraulic fluid	[kg] [lbs.]	17,0 37.5	
max. operating pressure	[Mpa] * [psi.]	70 10,153	
min. needed volume of hydraulic fluid	[l] ** [gal.-US]	0,066 0.017	
coupling system		quick-disconnect-coupling	mono-coupling

* 1 MPa = 10 bar

** Required volume of hydraulic fluid in the hydraulic power pack for operating the tool (differential volume piston/rod side)

12.3 Tightening torques for pivot bolt

type		LS 311 FI	LS 330 FI	LKS 35 FI
pivot bolt		M 24 x 1,5	M 24 x 1,5	M 24 x 1,5
wrench size	[mm] [in.]	36 1.42	36 1.42	36 1.42
torque	[Nm] [lbf.in.]	120 +10 1,062 + 89	120 +10 1,062 + 89	120 +10 1,062 + 89

12.4 Cutting performance

Cutting material	Cutting material dimensions		
	LS 311 FI max. [mm] [in.]	LS 330 FI max. [mm] [in.]	LKS 35 FI max. [mm] [in.]
Round material steel (acc. to EN 13204) 	33 1.30	33 1.30	30 1.18
Round material steel (acc. to NFPA 1936) 	33 1.30	33 1.30	30 1.18

12.5 Hydraulic fluid recommendations

Mineral oil DIN ISO 6743-4 for LUKAS hydraulic equipment and others

	Oil temperature range	Oil code	Viscosity rating	Remarks
A	-20 +55°C	HM 10	VG 10	
	Oil temperature range	Oil code	Viscosity rating	Remarks
A	-4.0 +131°F	HM 10	VG 10	

recommended viscosity range: 10...200 mm²/s **(10...200 cSt.)**

Supplied with HM 10 DIN ISO 6743-4.



CAUTION!

Before using hydraulic fluids, which do not correspond to the above-mentioned specifications and/or are not purchased from LUKAS, you have to contact LUKAS itself!

12.6 Operating and storage temperature ranges

Operating temperature	[°C]	-20	...	+55
Ambient temperature (device in operation)	[°C]	-25	...	+45
Storage temperature (device not in operation)	[°C]	-30	...	+60

Operating temperature	[°F]	-4	...	+131
Ambient temperature (device in operation)	[°F]	-13	...	+113
Storage temperature (device not in operation)	[°F]	-22	...	+140

13. EC Declarations of conformity

13.1 Cutting tools



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Dingler
Hurst
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EG-Konformitätserklärung / EC Declaration of Conformity

Im Sinne der EG-Maschinenrichtlinie 06/42/EG, Anhang II A
In accordance with the EC Machinery Directive 06/42/EG, Appendix II A

Hiermit erklären wir, dass die nachfolgend bezeichneten Schneidgeräte
We hereby declare that the following cutters

Besteller, / order no.	Bezeichnung / description
112070000	LS330FI-Stream
172070000	LS330FI-Stream

- in der von uns gelieferten Ausführung den Bestimmungen der Maschinenrichtlinie 06/42/EG (ersetzte Richtlinie 98/37/EG) und den sie umsetzenden nationalen Rechtsvorschriften entspricht.
Berücksichtigt wurden insbesondere die Normen:
 - DIN EN ISO 12100, Ausgabe:2004-04 – Sicherheit von Maschinen, Teil 1 und 2
 - DIN EN ISO 14121-1, Ausgabe: 2007-12 – Sicherheit von Maschinen - Leitsätze zur Risikobeurteilung
- in the versions supplied by us conform to the EC Machinery Directive 06/42/EG (replaced directive 98/37/EG) and the national statutory provisions that implement them.
The following standards have been taken into particular consideration:
 - DIN EN ISO 12100, publication date: 2004-04 – Safety of machinery, Parts 1 & 2
 - DIN EN ISO 14121-1, publication date: 2007-12 – Safety of machinery – Principles for risk assessment

Bei einer nicht mit uns abgestimmten Änderung oder Verwendung der Maschine/Ausrüstung verliert diese Erklärung ihre Gültigkeit.

This declaration loses validity in the case of alterations or usage of the machinery/equipment not approved by LUKAS.

Erlangen, 15.09.2009

Wolfgang Berleff,
Leiter Konstruktion / Manager Design
LUKAS Hydraulik GmbH

Manuela Gumbert
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EG-Konformitätserklärung / EC Declaration of Conformity

Im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anhang II A
In accordance with the EC Machinery Directive 2006/42/EG, Appendix II A

Hiermit erklären wir, dass die nachfolgend bezeichneten Schneidgeräte
We hereby declare that the following cutters

Artikelnr. / Item No.	Modell / Type
112075000	LS311FI-Stream
172075000	LS311FI-Stream

- in der von uns gelieferten Ausführung den Bestimmungen der Maschinenrichtlinie 2006/42/EG (ersetzt Richtlinie 98/37/EG) und den sie umsetzenden nationalen Rechtsvorschriften entspricht. Berücksichtigt wurden insbesondere die Normen:
 - DIN EN ISO 12100-1/A1, Ausgabe:2009-10 - Sicherheit von Maschinen – Grundbegriffe, allgemeine Gestaltungsleitsätze – Teil 1
 - DIN EN ISO 12100-2/A1, Ausgabe:2009-10 - Sicherheit von Maschinen – Grundbegriffe – allgemeine Gestaltungsleitsätze – Teil 2
 - DIN EN ISO 14121-1, Ausgabe: 2007-12 - Sicherheit von Maschinen - Leitsätze zur Risikobeurteilung
- in the versions supplied by us conform to the EC Machinery Directive 2006/42/EG (replaced directive 98/37/EG) and the national statutory provisions that implement them.
The following standards have been taken into particular consideration:
 - DIN EN ISO 12100-1/A1, publication date: 2009-10 – Safety of machinery - Basic concepts, general principles for design - Part 1
 - DIN EN ISO 12100-2/A1, publication date: 2009-10 – Safety of machinery - Basic concepts, general principles for design - Part 2
 - DIN EN ISO 14121-1, publication date: 2007-12 – Safety of machinery – Principles for risk assessment

Bei einer nicht mit uns abgestimmten Änderung oder Verwendung der Maschine/Ausrüstung verliert diese Erklärung ihre Gültigkeit.
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Erlangen, 11.10.2010

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Manuela Gumbert
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13.2 Combi tools



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EG-Konformitätserklärung / EC Declaration of Conformity

Im Sinne der EG-Maschinenrichtlinie 06/42/EG, Anhang II A
In accordance with the EC Machinery Directive 06/42/EG, Appendix II A

Hiermit erklären wir, dass die nachfolgend bezeichneten Kombigeräte
We hereby declare that the following combi tools

Bestellnr. / ordere no.	Bezeichnung / description
113070000	LKS35FI-Stream
173070000	LKS35FI-Stream

- in der von uns gelieferten Ausführung den Bestimmungen der Maschinenrichtlinie 06/42/EG (ersetzte Richtlinie 98/37/EG) und den sie umsetzenden nationalen Rechtsvorschriften entspricht.
Berücksichtigt wurden insbesondere die Normen:
 - DIN EN ISO 12100, Ausgabe: 2004-04 – Sicherheit von Maschinen, Teil 1 und 2
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This declaration loses validity in the case of alterations or usage of the machinery/equipment not approved by LUKAS.

Erlangen, 15.09.2009

Wolfgang Bertleff,
Leiter Konstruktion / Manager Design
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14. Notes



Please dispose all packaging materials and
dismantled parts properly

LUKAS Hydraulik GmbH
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